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Conference Abstract

The Marine Biodiversity Data Knowledge Gaps in the SW Pacific and Indian Oceans

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Abstract

Introduction: Oceans cover over 70% of Earth's surface (Cael et al. 2023). An estimated 2.2 million marine species exist, yet nearly 80% remain undescribed (Mora et al. 2011). Around 370,000 species are accepted in the World Register of Marine Species (WoRMS), but open-access occurrence data exists for only about 200,000 in the Ocean Biodiversity Information System (OBIS). Documenting marine biodiversity is vital for making evidence-based policy and management decisions in order to maintain ecosystem stability and planetary health. Initiatives such as the Census of Marine Life and open-access databases like OBIS continue to transform understanding and support the UN Decade of Ocean Science. Through data sharing and global collaboration, we can better estimate and conserve marine biodiversity by first identifying data and knowledge gaps.

Methods: In two underrepresented areas, the South-West Pacific (SWP) and the Indian Ocean (IO), the current biodiversity patterns of fauna were mapped to identify the knowledge gaps and distribution patterns by depth zones. All occurrence data (Animalia) were extracted from the OBIS and the Global Biodiversity Information Facility (GBIF). The occurrence records were quality-controlled in accordance with the OBIS data quality guidelines (OBIS 2025). Only accepted marine taxa were retained after cross-referencing

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species names with the WoRMS. In total, 5,441,962 occurrence records in the SWP and 7,768,826 occurrence records in the IO were used in this study (Suppl. material 1).

Results: The number of occurrence records decreased with depth in all taxa in both oceans. More than 60% of the occurrence records with available depth information were from shallow waters (0–200 m), highlighting significant knowledge gaps in deep-sea biodiversity. Still, more than 11 million km² of the SWP and IO had fewer than 50 occurrence records after data cleaning in the shallow waters. Based on 5-degree latitudinal bands, the higher latitudes of the SWP (0–25°S) were less sampled or the data were not reported, compared to the lower latitudes. Mid-latitudes of the SWP (30–45°S, eastern and western Australia) had the greatest distribution records, mostly related to Chordata, followed by Arthropoda and Mollusca. However, 10–25°S latitudes of the SWP had the highest number of reported species, mostly associated with Chordata, followed by Mollusca and Arthropoda. The mid-latitudes of the IO (5–30°S) were less sampled, or the data were not reported, compared to the upper and lower latitudes. Chordata occurrence records were the exception, with a peak at 10–25°S latitudes showing the highest distribution records, followed by Arthropoda. Also, 10–20°S latitudes of the IO had the greatest number of species, mostly related to Chordata, followed by Arthropoda and Mollusca (Suppl. material 2) and (Suppl. material 3).

Application: The generated knowledge is crucial for strengthening biodiversity monitoring and ensuring rapid, accessible information for policymakers through science-policy interfaces such as the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), thereby supporting the development of urgent conservation strategies for underrepresented and threatened marine ecosystems, such as the SWP and the IO, before it is too late.

Keywords

marine biodiversity, shallow water, deep sea, knowledge gaps, Southwest Pacific, science-policy interface, conservation

Presenting author

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Ethics and security

The study used only open-access, publicly available data. No human participants or animals were involved, and no ethical approval was required.

Conflicts of interest

The authors have declared that no competing interests exist.

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Supplementary materials

Suppl. material 1: Supplementary Figure 1 doi

Authors: Hanieh Saeedi
Data type: occurrences
Brief description: Quality-controlled occurrence records of Animalia in the Indian Ocean (IO) and the South-West Pacific (SWP): (a–c) IO: all depths, shallow waters (0–500 m), and deep sea (> 500 m); (d–f) SWP: all depths, shallow waters (0–500 m), and deep sea (> 500 m). Figure by Hanieh Saeedi; licensed under CC BY 4.0.
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Suppl. material 2: Supplementary Table 1 doi

Authors: Hanieh Saeedi
Data type: taxonomic
Brief description: Taxonomic composition of Animalia occurrence records from the South-West Pacific (SWP). The table lists the number of scientific names, orders, species, families, classes, and genera of each phylum, compiled from quality-controlled datasets used in this study. The citation for the GBIF datasets is https://doi.org/10.15468/dl.g98d3t. The citation for the OBIS dataset is listed in the second sheet of Supplementary Table 1.
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Suppl. material 3: Supplementary Table 2 doi

Authors: Hanieh Saeedi
Data type: taxonomic
Brief description: Taxonomic composition of Animalia occurrence records from the Indian Ocean (IO). The table lists the number of scientific names, orders, species, families, classes, and genera of each phylum, compiled from quality-controlled datasets used in this study. The citation for the GBIF datasets is https://doi.org/10.15468/dl.gbndjc. The citation for the OBIS dataset is listed in the second sheet of Supplementary Table 2.
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